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PATENT ABSTRACTS OF JAPAN

(11) Publication number : 2001-069731

(43) Date of publication of application : 16.03.2001

(51) Int.Cl.

H02K 15/04
H02K 3/04

(21) Application number : 11-245141

(71) Applicant : DENSO CORP

(22) Date of filing : 31.08.1999

(72) Inventor : NAKA YOSHIO

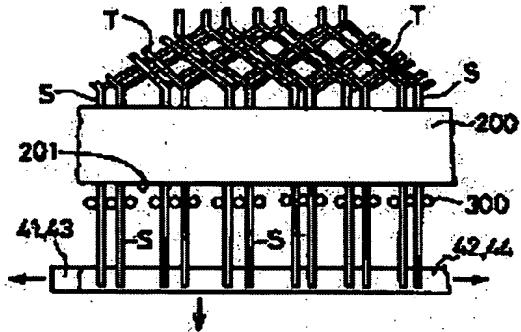
MAESO KAZUKI

SUGIYAMA MASARU

(54) MANUFACTURE OF COIL OF ROTARY ELECTRIC MACHINE

(57) Abstract:

PROBLEM TO BE SOLVED: To provide a method of manufacturing a coil of a rotary electric machine that can prevent deterioration of insulating film due to the twisting of tip for coil end of a conductor segment by avoiding addition of complicated manufacturing process and controlling increase of manufacturing work and cost.



SOLUTION: Since many pin-type jigs 300 are individually inserted adjacently almost in the diameter direction to the circumference direction of the base end tip S of each coil end projected from one end surface 201 of a stator core 200 and the base portion of the tip S for coil end using as the fulcrum the pin-type jig 300 having the round cross-section in the circumference direction is twisted in the circumference direction concentration of stress at the base end portion of the tip S for coil end can be alleviated with that in the existing method where the base end portion of the tip S for coil end is twisted using the cross-section at the right angle to the circumference portion of slot of the core 200 as the bending fulcrum.

LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

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(19)日本国特許庁 (JP)

(12) 公開特許公報 (A)

(11)特許出願公開番号

特開2001-69731

(P2001-69731A)

(43)公開日 平成13年3月16日(2001.3.16)

(51)Int.Cl.
H 02 K 15/04
3/04

識別記号

F I
H 02 K 15/04
3/04テーマコード(参考)
F 5 H 6 0 3
J 5 H 6 1 5

審査請求 未請求 請求項の数3 OL (全9頁)

(21)出願番号 特願平11-245141

(22)出願日 平成11年8月31日(1999.8.31)

(71)出願人 000004260
株式会社デンソー
愛知県刈谷市昭和町1丁目1番地

(72)発明者 仲 美雄
愛知県刈谷市昭和町1丁目1番地 株式会
社デンソー内

(72)発明者 前畠 和樹
愛知県刈谷市昭和町1丁目1番地 株式会
社デンソー内

(74)代理人 100081776
弁理士 大川 宏

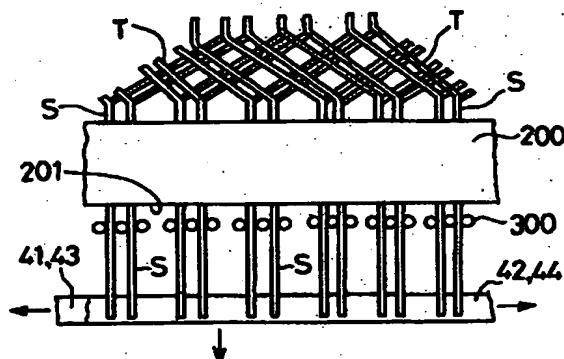
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(54)【発明の名称】 回転電機の巻線製造方法

(57)【要約】

【課題】複雑な製造工程の追加を回避し、製造作業や製造費用の増大を抑止しつつ導体セグメントのコイルエンド用先端部の捻りによる絶縁皮膜の劣化を防止可能な回転電機の巻線製造方法を提供すること。

【解決手段】ステータコア200の一端面201から飛び出した各コイルエンド用先端部Sの基礎部に周方向に個別に隣接して多数のピン状治具300を略径方向に挿入し、周方向断面が丸いピン状治具300を支点としてコイルエンド用先端部Sの基礎部を周方向へ捻るので、コア200のスロット周縁部直角断面を曲げ支点としてコイルエンド用先端部Sの基礎部を捻る従来方法に比較して、格段にコイルエンド用先端部Sの基礎部における応力集中を緩和することができる。



【0010】このようにすれば、セグメント導体先端部屈曲工程において、セグメント導体のコイルエンド用先端部を周方向に捻る際に、セグメント導体のコイルエンド用基端部の絶縁皮膜がコアの他端面におけるスロット周縁の角部により傷付くのを防止することができる。

【0011】更に説明すれば、コアの一端面から突出するコイルエンド用先端部を周方向に捻る際に、セグメント導体はコアの一端面においてスロットから引き摺りだされるよう付勢され、これにより、セグメント導体はスロットの他端側の開口周囲のコア角部に強く押し付けられつつ、スロット内部に引きこまれようとし、この時、セグメント導体が曲がっていると、コイルエンド用基端部の絶縁皮膜はこのコア角部で傷付けられてしまう。そこで、この部位におけるコイルエンド用基端部をあらかじめスロットと同じ方向としておくことにより、この問題を解決することができる。

【0012】請求項3記載の構成によれば請求項1記載の回転電機の巻線製造方法において更に、コアの他端面から突出してコアの他端側のコイルエンドを構成するセグメント導体のコイルエンド用基端部を周方向変位不能に保持しつつ、セグメント導体先端部屈曲工程を実施する。

【0013】このようにすれば、コアの一端側のコイルエンドを形成するためにコイルエンド用先端部を周方向へ捻って際に、コアの他端側のコイルエンドを形成するためのセグメント導体のコイルエンド用基端部が周方向へ付勢されて捻れ、コイルエンド用基端部の絶縁皮膜はこのコア角部で傷付けられてしまうのを防止することができる。

【0014】

【発明を実施するための態様】本発明の好適な態様を以下の実施例により説明する。

【0015】

【実施例】(U字導体A～D及びリア側捻り治具1の準備)まず、図1に示すように、リア側捻り治具1を準備する。

【0016】このリア側捻り治具1は、リング状の固定フレーム10に外側リング状治具(第一治具)11を回動自在に収容し、外側リング状治具の径内側に内側リング状治具(第二治具)12を回動自在に収容したものである。

【0017】外側リング状治具11及び内側リング状治具12の端面には、後述するオルタネータのステータコアのスロットと等位置にて貫通穴13、14が設けられている。外側リング状治具11の貫通穴13はスロットの外周側半分に等位置、内側リング状治具12の貫通穴14はスロットの内周側半分に等位置に設定されている。

【0018】次に、大回り形状の中間部用U字導体A、小回り形状の中間部用U字導体B、引き出し用U字状導

体C、層間接続用U字導体Dが必要本数準備される。

【0019】ここでは、スロット数は96、A、Bはそれぞれ90本、C、Dはそれぞれ6本とされる。各U字導体A～Dは、互いに所定間隔を隔てて直線状に伸びる一対の直線部Sと、これら両直線部S、Sの基端間を繋ぐ曲部UUとを有する。

【0020】図2に示すように、ステータコア200の各スロット201は、その径外側から順に第一位置S1、第二位置S2、第三位置S3、第四位置S4が設定され、各直線部Sがこれら4つの位置に収容されるよう、各U字導体A～Dの両直線部S間の間隔が設定される。

【0021】更に説明すると、U字導体Aの上記間隔はその両直線部Sを第一位置S1と第四位置S4とに個別に挿入可能に設定され、U字導体Bの上記間隔はその両直線部Sを第二位置S2と第三位置S3とに個別に挿入可能に設定され、U字導体Cの上記間隔はその両直線部Sを第一位置S1と第三位置S3とに個別に挿入可能に設定され、U字導体Dの上記間隔はその両直線部Sを第二位置S2と第四位置S4とに個別に挿入可能に設定されている。

【0022】(各U字導体A～Dをリア側捻り治具1へ挿入する工程)次に、図1に示すように各U字導体A～Dを順次、リア側捻り治具1の貫通穴13、14に挿入していく。なお、一つのU字導体の両直線部Sは、互いに径方向に隣接する(周方向等位置にある)所定の一つの貫通穴13と所定の一つの貫通穴14とに個別に挿入される。

【0023】したがって、外側リング状治具(第一リング)11の貫通穴13はスロット201の第一位置S1、第二位置S2に等位置に形成され、内側リング状治具(第二リング)12の貫通穴14はスロット201の第三位置S3、第四位置S4に等位置に形成されている。以下、説明を簡単にするために、貫通穴13の第一位置S1に相当する位置を同じく第一位置S1と呼び、貫通穴13の第二位置S2に相当する位置を同じく第二位置S2と呼び、貫通穴14の第三位置S3に相当する位置を同じく第三位置S3と呼び、貫通穴14の第四位置S4に相当する位置を同じく第四位置S4と呼ぶ。

【0024】したがって、径方向に隣接する一対の貫通穴13、14には、U字導体A、Bすなわち中間部用U字導体のペア、もしくは、U字導体C、Dすなわち端部用U字状導体のペアが挿入される。

【0025】各U字導体A、Bの直線部Sは、後述するように、それぞれステータコア200のフロント側で一対ずつ接続されて合計6相の相コイル(U、V、W、X、Y、Z)を最終的に構成するための導体セグメントである。

【0026】U字状導体Dは、大回り形状の中間部用U字導体Aからなる上記相コイルの一端部と、小回り形状

部（周方向屈曲部）Tと直線部Sとの境界部の絶縁皮膜には強い曲げストレスが掛かっているため、この部分がステータコア200のリア側の端面に接触して、その後になされる各U字導体A'～D'のフロント側の捻りなどにおいて更に強い曲げストレスを受けて破れたり劣化するのを防止するためである。

【0045】(ピン状治具の挿入工程) 次に、図12に示すように、リング状治具41～44をステータコア200のフロント側の端面201から所定距離軸方向遠ざける。次に、ステータコア200の端面201の近傍において、端面201からフロント側に突出する各U字導体A'～D'の直線部Sに周方向に隣接する位置にて、多数のピン状治具300を径外側から径内方向へ個別に差し込む。これにより各ピン状治具300は、各U字導体A'～D'の直線部Sをステータコア200のフロント側の端面201近傍にて周方向に挟持される。

【0046】ピン状治具300の断面は円形とされるが、各U字導体A'～D'の直線部Sに面する側が所定の曲率の湾曲面であれば円形でなくてもよい。

【0047】(フロント側の渡り導体部の形成工程) 次に、図12に示すように、リング状治具41、43を一向方向へ $\pi/2$ 回動させ、リング状治具42、44を逆方向へ $\pi/2$ 回動させる。各U字導体A'～D'はステータコア200に保持されているので、各U字導体A'～D'のステータコア200からフロント側に突出する直線部Sは、ピン状治具300を曲げ支点として周方向に屈曲され、その結果、これら直線部Sは略周方向へ変形してフロント側の渡り導体部となる。

【0048】その後、ピン状治具300を径外側へ抜き去り、リング状治具41～44の貫通穴から、各U字導体A'～D'の直線部Sを抜き出し、また、中間部用U字導体押さえ用治具2を各U字導体A'～D'から取り外す。なお、この段階まで中間部用U字導体押さえ用治具2を取り外さないのは、フロント側の渡り導体部の作製のための上記リング状治具41～44の回動時に各U字導体A'～D'の曲部UUが軸方向リア側へ突出したり、周方向へねじれたりするのを防止するためである。

【0049】なお、中間部用U字導体押さえ用治具2の代わりに、図13に示すように、特別の固定用治具400で、各U字導体A'～D'のリヤ側の渡り導体部の先端をチャックして、上記フロント側の捻り作業を行ってもよい。

【0050】次に、大回り形状の中間部用U字導体A'の第一位置S1の先端部Eと、このU字導体A'と電気角で π 離れた小回り形状の中間部用U字導体B'の第二位置S2の先端部とを密着させる。同様に、大回り形状の中間部用U字導体A'の第四位置S4の先端部Eと、このU字導体A'と電気角で π 離れた小回り形状の中間部用U字導体B'の第三位置S3の先端部とを密着させる。

【0051】また、引き出し用U字状導体C'の第一位S1の先端部Eと、このU字導体C'と電気角で π 離れた小回り形状の中間部用U字導体B'の第二位置S2の先端部とを密着させる。同様に、引き出し用U字状導体C'の第三位置S3の先端部Eと、このU字導体C'と電気角で π 離れた大回り形状の中間部用U字導体A'の第四位置S4の先端部とを密着させる。

【0052】更に、層間接続用U字導体D'の第二位置S2の先端部Eと、このU字導体D'と電気角で π 離れた大回り形状の中間部用U字導体A'の第一位S1の先端部とを密着させる。同様に、層間接続用U字導体D'の第四位置S4の先端部Eと、このU字導体D'と電気角で π 離れた小回り形状の中間部用U字導体B'の第三位置S3の先端部とを密着させる。

【0053】これらの端部密着作業は、次の溶接工程のための準備として行われる。

【0054】(溶接工程) 次に、図14に示すように、各U字導体A'～D'の互いに隣接する各対の先端E、Eを一対ずつ溶接してフロント側の渡り導体部を完成し、これによりU、V、W、X、Y、Zの6相のコイルが形成され、これら6相のコイルが接続されて三相ステータコイル(本発明でいう巻線)がほぼ完成する(図15参照)。

【0055】(引き出し用U字状導体C'の曲部UU切除工程) 次に、各引き出し用U字状導体C'の直線部Sをそれぞれ好適な切断位置300、301で切断し(図16参照)、その先端部400の樹脂剥離を行い、それぞれ周方向へ所定距離だけ曲げて引き出し線500とする(図17参照)。

【0056】それぞれ一対の引き出し線を有する相コイルが6個形成される。図19に各相コイルの引き出し線500の引き出し位置を示す。

【0057】ちなみにこの実施例では、合計6個の相コイルが作製されることになる。したがって、少なくとも6本の引き出し用U字状導体Cがこれら各相コイルの両端引き出し用に用意され、また、各相コイルの内部において層間接続用に6本の層間接続用U字導体Dが用意される。

【図面の簡単な説明】

【図1】 本発明の回転電機の巻線製造方法の一工程を示す斜視図である。

【図2】 ステータコアのスロット近傍を示す部分正面図である。

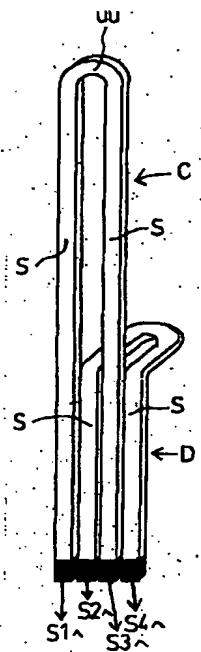
【図3】 引き出し用U字状導体及び層間接続用U字導体の斜視図である。

【図4】 中間部用U字導体押さえ用治具の斜視図である。

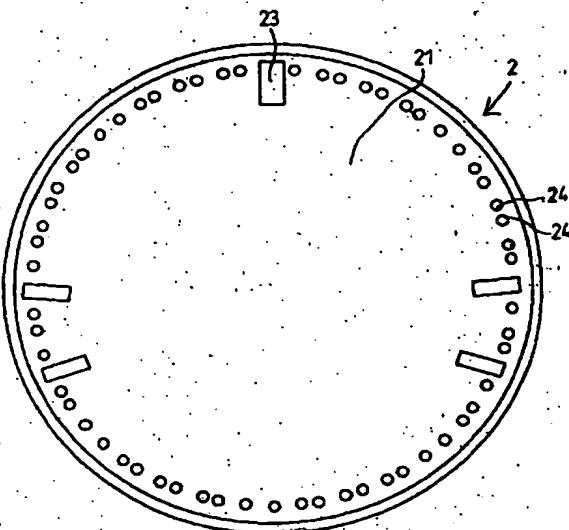
【図5】 中間部用U字導体押さえ用治具の正面図である。

【図6】 本発明の回転電機の巻線製造方法の一工程を

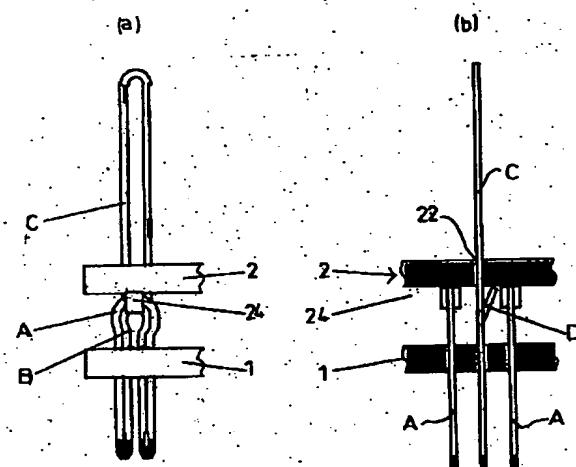
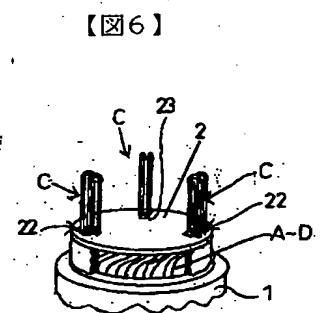
【図3】



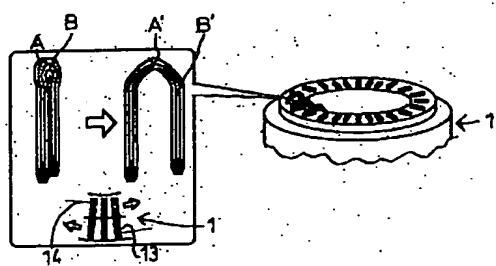
【図5】



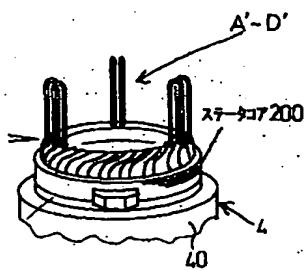
【図7】



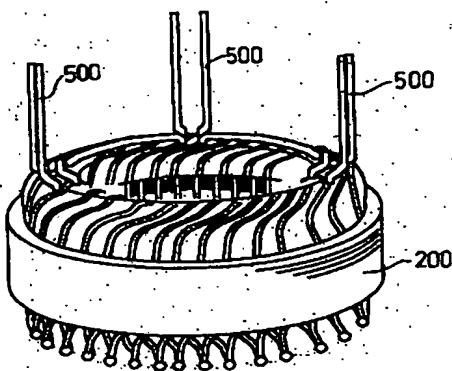
【図8】



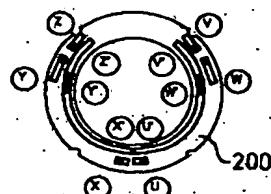
【図10】



【図18】



【図19】



フロントページの続き

(72)発明者 杉山 優
愛知県刈谷市昭和町1丁目1番地 株式会
社デンソー内

F ターム(参考) 5H603 AA04 AA09 BB02 BB12 CA01
CB03 CB11 CC03 CC17 CD22
CD33 CE01 CE05
5H615 AA01 BB02 BB14 PP01 PP08
PP14 QQ03 QQ12 QQ27 SS04
SS10 SS15

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DETAILED DESCRIPTION**[Detailed Description of the Invention]**

[0001]

[The technical field to which invention belongs] This invention relates to the coil manufacture method of a dynamo-electric machine.

[0002]

[Description of the Prior Art] WO 92/06527 (PCT/DE 91/00738) each slot of a stator core -- the conductor of the shape (the shape of a straight line) of the shape of U character, and I character -- a segment in large numbers from the end side side of a core these conductors that inserted in and jumped out to the other end side side of a core -- the coil of a segment, and business -- it is indicating bending a point to an abbreviation hoop direction near the end side of a core (it twisting), joining the point of each coil and the section a couple every after that, and constituting a stator coil.

[0003]

[Problem(s) to be Solved by the Invention] however, the above-mentioned conductor -- the coil of a segment, and business -- since bending of a point bends the slot periphery section in the end face of a stator core and is performed as the supporting point of business -- the end face of the abbreviation right angle of the slot periphery section -- a coil and business -- local bending stress may have concentrated on the insulating coat of the end face section of a point, and the reinforcement may have deteriorated.

[0004] Although it could consider attaching R to the slot periphery section of a stator core, and making the above-mentioned bending stress ease in order to have solved this problem, there was a defect which the problem of causing the complication which cannot disregard a manufacturing process derives.

[0005] while this invention is made in view of the above-mentioned trouble, the addition of a complicated manufacturing process is avoided and buildup of fabrication operation or manufacture costs is inhibited -- a conductor -- the coil of a segment, and business -- it sets it as the object to offer the coil manufacture method of the dynamo-electric machine which can prevent deterioration of the insulating coat by twist of a point.

[0006]

[Means for Solving the Problem] By coil manufacture method of a dynamo-electric machine according to claim 1 which solves the above-mentioned technical problem Adjoin the end face section of each point for coil ends which jumped out of an end side of a core according to an individual in a hoop direction, and many pin-like fixtures are inserted in the **** direction. Since a hoop direction cross section uses a round pin-like fixture as the supporting point and the end face section of a point for coil ends is twisted in the predetermined direction a slot periphery section right-angle cross section of a core -- as the bending supporting point -- a coil and business -- a conventional method of twisting the end face section of a point -- comparing -- markedly -- alike -- a coil and business -- stress concentration in the end face section of a point can be eased. In addition, it is because this can have the hoop direction cross section where a pin-like fixture is round and elastic deformation of the pin-like fixture can be further carried out at the time of a twist of this point for coil ends.

[0007] consequently -- while according to this configuration avoiding an addition of a complicated

manufacturing process and inhibiting buildup of fabrication operation or manufacture costs -- a conductor -- a coil of a segment, and business -- a coil manufacture method of a dynamo-electric machine which can prevent deterioration of an insulating coat by twist of a point is realizable.

[0008] for example, this segment -- a conductor -- a point crookedness process Prepare an advice member arranged in a path outside rather than a slot, and each pin-like fixture is inserted in the guide section of a large number installed in the direction of a path by end face of the ring tabular base possible [the direction displacement of a path]. while each pin-like fixture is stuffed into the path inside along with the guide section and an end face of a core is met in a point of each pin-like fixture -- a segment -- a coil of a conductor, and business, if it can carry out by method of making a hoop direction a point adjoin according to an individual etc. and does in this way Insertion of each pin-like fixture can be simplified.

[0009] a segment which according to the configuration according to claim 2 projects from an other end side of a core and constitutes a coil end by the side of the other end of a core further in a coil manufacture method of a dynamo-electric machine according to claim 1 -- a coil of a conductor, and business -- the condition of having made the end face section extending in shaft orientations near the other end side of a core -- a segment -- a conductor -- a point crookedness process is carried out.

[0010] thus -- if it carries out -- a segment -- a conductor -- a point crookedness process -- setting -- a segment -- a coil of a conductor, and business -- the time of twisting a point to a hoop direction -- a segment -- a coil of a conductor, and business -- it can prevent that an insulating coat of the end face section gets damaged by corner of a slot periphery in an other end side of a core.

[0011] A conductor is energized so that it may begin to be dragged from a slot in an end side of a core. furthermore, a coil which projects from an end side of a core if it explains and business -- the time of twisting a point to a hoop direction -- a segment -- thereby a segment -- it is drawn in the interior of a slot, a conductor being strongly pushed to a core corner of the perimeter of a opening by the side of the other end of a slot -- it is going to have -- this time -- a segment -- if a conductor has bent -- a coil and business -- an insulating coat of the end face section will be damaged by this core corner. Then, this problem is solvable what the end face section for coil ends in this part is beforehand made into the same direction as a slot for.

[0012] a segment which according to the configuration according to claim 3 projects from an other end side of a core and constitutes a coil end by the side of the other end of a core further in a coil manufacture method of a dynamo-electric machine according to claim 1 -- a coil of a conductor, and business -- while holding the end face section to hoop direction displacement impossible -- a segment -- a conductor -- a point crookedness process is carried out.

[0013] if it carries out, in order [thus,] to form a coil end by the side of an end of a core -- a coil and business -- a segment for twisting a point to a hoop direction and forming a coil end by the side of the other end of a core in the case -- a coil of a conductor, and business -- the end face section energizes to a hoop direction -- having -- being twisted -- a coil and business -- it can prevent that an insulating coat of the end face section will be damaged by this core corner.

[0014]

[A mode for inventing] The following examples explain a suitable mode of this invention.

[0015]

[Example] (U characters a conductor preparation of A-D and the rear side twist fixture 1) First, as shown in drawing 1, the rear side twist fixture 1 is prepared.

[0016] This rear side twist fixture 1 is held for the outside ring-like fixture (the first fixture) 11 in the fixed ring-like frame 10, enabling free rotation, and is held for the inside ring-like fixture (the second fixture) 12 in it inside [path] an outside ring-like fixture, enabling free rotation.

[0017] Through holes 13 and 14 are formed in the end face of the outside ring-like fixture 11 and the inside ring-like fixture 12 in locations [slot / of the stator core of the AC dynamo mentioned later]. The through hole 14 of locations [one half / of a slot / periphery side] and the inside ring-like fixture 12 is set as locations [one half / of a slot / inner circumference side] for the through hole 13 of the outside ring-like fixture 11.

[0018] next, the object for the pars intermedia of a long-way-around configuration -- U characters -- the

object for the pars intermedia of Conductor A and a small turn configuration -- U characters -- Conductor B and the shape of U character for drawers -- a conductor -- C and the object for interlayer connections -- U characters -- a conductor -- the need number preparations of the D are made.

[0019] Here, 96, and A and B are set to C and 90 and D are made into six for the number of slots, respectively. U characters each -- a conductor -- A-D has the pars convoluta lobuli corticalis renis UU which connects between the end faces of the bay S of the couple which separates a predetermined gap mutually and is extended in the shape of a straight line, and both [these] the bays S and S.

[0020] as shown in drawing 2, the first location S1, the second location S2, the third location S3, and the fourth location S4 are set up sequentially from the path outside, and, as for each slot 201 of a stator core 200, each bay S is held in these four locations -- as -- U characters each -- a conductor -- the gap between both the bays S of A-D is set up.

[0021] Furthermore, if it explains, the above-mentioned gap of Conductor A of U characters will be set to the first location S1 and the fourth location S4 possible [insertion according to an individual] in both the bay S. The above-mentioned gap of Conductor B of U characters is set to the second location S2 and the third location S3 possible [insertion according to an individual] in both the bay S. U characters -- a conductor -- the above-mentioned gap of C sets both the bay S to the first location S1 and the third location S3 possible [insertion according to an individual] -- having -- U characters -- a conductor -- the above-mentioned gap of D is set to the second location S2 and the fourth location S4 possible [insertion according to an individual] in both the bay S.

[0022] (U characters each a conductor process which inserts A-D in the rear side twist fixture 1) next, it is shown in drawing 1 -- as -- U characters each -- a conductor -- A-D is inserted in the through holes 13 and 14 of the rear side twist fixture 1 one by one. In addition, U characters is inserted in one predetermined (it is in locations, such as a hoop direction) through hole [one] 13 by which both the bays S of a conductor adjoin in the direction of a path mutually, and one predetermined through hole 14 according to an individual.

[0023] Therefore, the through hole 13 of the outside ring-like fixture (the first ring) 11 is formed in locations [location / first location / of slot 201 / S1, / S2 / second], and the through hole 14 of the inside ring-like fixture (the second ring) 12 is formed in locations [S4 / third location / of slot 201 / S3, / fourth location]. Hereafter, in order to simplify explanation, similarly the location which is similarly equivalent to the third location S3, a call, and the fourth location S4 of a through hole 14 in the location which is similarly equivalent to the second location S2 and the third location S3 of a call and a through hole 14 in the location which is similarly equivalent to the first location S1 and the second location S2 of a call and a through hole 13 in the location equivalent to the first location S1 of a through hole 13 calls the fourth location S4.

[0024] therefore -- the through holes 13 and 14 of the couple which adjoins in the direction of a path -- U characters -- the conductors A and B for pars intermedia, i.e., an object, -- U characters -- the pair of a conductor, or U characters -- Conductors C and D, i.e., the shape of U character for edges, -- the pair of a conductor is inserted.

[0025] the conductor for connecting a couple every by the front side of a stator core 200, respectively, and constituting eventually the phase coil (U, V, W, X, Y, Z) of a total of six phases so that it may mention each the bay S of Conductors A and B of U characters later -- it is a segment.

[0026] the shape of U character -- a conductor -- D -- the object for the pars intermedia of a long-way-around configuration -- the end section of the above-mentioned phase coil which consists of a conductor A U characters, and the object for the pars intermedia of a small turn configuration -- the object for the interlayer connections for carrying out the series connection of the end section of the above-mentioned phase coil which consists of a conductor B U characters -- U characters is a conductor.

[0027] U characters -- a conductor -- C -- the object for the pars intermedia of a long-way-around configuration -- the other end of the above-mentioned phase coil which consists of a conductor A U characters, and the object for the pars intermedia of a small turn configuration -- the shape of U character for drawers which constitutes the ends of the coil for one phase of the above-mentioned three phase coil by connecting with the other end of the above-mentioned phase coil which consists of a

conductor B U characters, and excising the pars convoluta lobuli corticalis renis UU so that it may mention later -- it is a conductor. therefore, U characters -- a conductor -- in order that C may make an outgoing line serve a double purpose later, others of U characters are formed for a long time [shaft orientations] than Conductors A, B, and D.

[0028] as shown in drawing 3, in order [moreover,] to insert U characters in the through holes 13 and 14 of the couple of a couple which adjoins a total of four bays S of Conductors C and D in the direction of a path in locations, such as a hoop direction, -- the object for interlayer connections -- U characters -- a conductor -- the pars convoluta lobuli corticalis renis UU of D is bent to the hoop direction. thereby -- the shape of U character for drawers -- a conductor -- one of the bays S of C -- the third location S3 -- setting -- the third location S3 of the through hole 14 of the inside ring-like fixture 12 of the rear side twist fixture 1 -- the object for interlayer connections -- U characters -- a conductor -- it can insert, without being interfered by D.

[0029] (For pars intermedia U characters a conductor preparation of the fixture 2 for a presser foot) next, U characters -- the pars convoluta lobuli corticalis renis UU Of Conductors A, B, and D -- a presser foot and U characters -- a conductor -- the object for pars intermedia with the hole which C penetrates -- U characters -- a conductor -- the fixture 2 for a presser foot is prepared.

[0030] this object for pars intermedia -- U characters -- a conductor -- some fixtures 2 for a presser foot -- a fracture perspective diagram is shown in drawing 4, and the plan seen from shaft-orientations one of these is shown in drawing 5.

[0031] a fixture 2 -- the bucket-like member of a shallow bottom -- it is -- the pars basilaris ossis occipitalis 21 -- the shape of U character for drawers -- a conductor -- the hole 23 in which the hole 22 which C penetrates has twice as many hoop direction width of face as this rather than four pieces and a hole 22 is formed. a hole 22 -- respectively -- the one shape of U character for drawers -- a conductor -- C carries out insertion possible -- having -- a hole 23 -- the two shape of U character for drawers -- a conductor -- insertion possible [of C] is carried out (refer to drawing 6).

[0032] Moreover, the pair of the projection 24 for grasping of the predetermined number for grasping each the center section of the pars convoluta lobuli corticalis renis UU of Conductors A, B, and D according to an individual U is prepared in the base of a fixture 2 over a round.

[0033] (U characters each the conductor by the fixture 2 maintenance of A-D) U characters each inserted in the through holes 13 and 14 of the rear side twist fixture 1 by the above-mentioned process in the predetermined array -- a conductor -- this fixture 2 is put on the pars convoluta lobuli corticalis renis UU of A-D, and as shown in drawing 6, it supports to it so that a fixture 2 may not be rotated. this time -- the shape for drawers of U character long to shaft orientations -- a conductor -- C projects from holes 22 and 23 to shaft orientations. U characters each -- a conductor -- the maintenance condition of A-D is shown in drawing 7.

[0034] (The passage of the rear side by reverse rotation (twist) of the rear side twist fixture 1 a conductor plastic surgery of the section) Next, only a predetermined angle (as a whole the electrical angle pi) makes hard flow rotate the outside ring-like fixture 11 of the rear side twist fixture 1, and the inside ring-like fixture 12 of each other so that it may sketch in drawing 8. In addition, the graphic display of a fixture 2 is omitted in drawing 8.

[0035] the passage of the rear side crooked to the hoop direction by this -- a conductor -- Section T (refer to drawing 8) forms -- having -- U characters -- a conductor -- A-D -- respectively -- a passage -- a conductor -- it has Section T -- U characters becomes conductor A' - D' (refer to drawing 9). In drawing 8, S of U characters is the bay of conductor A' - D'. in addition -- drawing 8 -- U characters -- Conductors A and B -- only the change to conductor A' and B' of U characters is illustrated.

[0036] in addition -- irrespective of reverse rotation of these fixtures 11 and 12 -- the shape of U character for drawers -- a conductor -- since the bay S of the couple which adjoins the pars convoluta lobuli corticalis renis UU of C and it is inserted in the holes 22 and 23 of a fixture 2, it does not deform.

[0037] (Preparation of a stator core 200 and the front side twist fixture 4) Next, a stator core 200 and the front side twist fixture 4 are prepared. It is as having already described the stator core 200.

[0038] The front side twist fixture 4 has the configuration where the outside ring-like fixture 11 and the

inside ring-like fixture 12 were halved, respectively, as shown in drawing 12.

[0039] Furthermore, if it explains, four respectively rotatable ring-like fixtures 41-44 will be formed in the inside, and the front side twist fixture 4 will become the fixed ring-like frame 40 from the direction outside of a path, as shown in drawing 10.

[0040] In a hoop direction and the direction of a path, a through hole (the first location through hole) is prepared [the end face of the ring-like fixture 41] in the first location S1 of the above in an equal location at shaft orientations. In a hoop direction and the direction of a path, a through hole (the second location through hole) is prepared [the end face of the ring-like fixture 42] in the second location S2 of the above in an equal location at shaft orientations. In a hoop direction and the direction of a path, a through hole (the third location through hole) is prepared [the end face of the ring-like fixture 43] in the third location S3 of the above in an equal location at shaft orientations. In the hoop direction and the direction of a path, the through hole (the fourth location through hole) is prepared [at the end face of the ring-like fixture 44] in shaft orientations in the equal location at the above-mentioned fourth location S4.

[0041] The end face by the side of the front of a stator core 200 is stuck to the end face of this front side twist fixture 4; and each slot is made in agreement with each through hole of the ring-like fixtures 41-44.

[0042] (U characters moving process of a conductor) next -- respectively -- a passage -- a conductor -- U, conductor A' - D' is sampled from (refer to drawing 9) and a fixture 1, while [which held those array conditions to the fixture 2] the section had been formed, and it inserts it each in each of that slot from the end face of the rear side of a stator core 200 (refer to drawing 10). Thereby, the point in which the bay S of conductor A' - D' of U characters exfoliated each beforehand penetrates a slot, and is inserted in each above-mentioned through hole of a fixture 4 according to an individual.

[0043] In addition, the bay S of conductor A' - D' suspends each the insertion of U characters into a slot of U characters to the stator core 200 of conductor A' - D' in the condition of having projected for a while from the end face of the rear side of a stator core 200. the segment which this says by this invention -- the coil of a conductor, and business -- the end face section will extend in shaft orientations by this bay S near the end face (other end side) of the rear side of a stator core 200.

[0044] this -- U characters each -- the passage of conductor A' - D' -- a conductor, since bending stress strong against the insulating coat of the boundary section of Section (hoop direction flection) T and Bay S has started It is for preventing that is torn in response to still stronger bending stress, or it deteriorates each as for which in the twist by the side of the front of conductor A' - D' etc. that this portion contacts the end face of the rear side of a stator core 200, and is made after that U.

[0045] (Insertion process of a pin-like fixture) next, it is shown in drawing 12 -- as -- the ring-like fixtures 41-44 -- predetermined distance shaft-orientations ***** from the end face 201 by the side of the front of a stator core 200. Next, many pin-like fixtures 300 are inserted in path inboard according to an individual from a path outside [near the end face 201 of a stator core 200] in the location which projects in a front side from an end face 201 and which adjoins each the bay S of conductor A' - D' U in a hoop direction. Thereby, each pin-like fixture 300 of U characters is pinched each by the hoop direction in the bay S of conductor A' - D' by about 201 end face by the side of the front of a stator core 200.

[0046] Although the cross section of the pin-like fixture 300 is circular, it may not be circular as long as the side which faces each the bay S of conductor A' - D' U is the bow side of predetermined curvature.

[0047] (The passage by the side of a front a conductor formation process of the section) Next, as shown in drawing 12, the ring-like fixtures 41 and 43 are rotated pi/2 to an one direction, and the ring-like fixtures 42 and 44 are rotated pi/2 to hard flow. since conductor A' - D' of U characters is held each at the stator core 200 -- U characters each -- Conductor A -- the bay S which projects in a front side from the stator core 200 of '-D' is crooked in a hoop direction considering the pin-like fixture 300 as the bending supporting point -- having -- consequently, these bays S -- an abbreviation hoop direction -- deforming -- the passage by the side of a front -- a conductor -- it becomes the section.

[0048] then, the pin-like fixture 300 -- a path outside -- extracting -- U characters each from the through

hole of the ring-like fixtures 41-44 -- the bay S of conductor A' - D' -- a draw and the object for pars intermedia -- U characters -- a conductor -- the fixture 2 for a presser foot -- U characters each -- Conductor A -- it removes from '-D'. in addition -- up to this phase -- the object for pars intermedia -- U characters -- a conductor -- not removing the fixture 2 for a presser foot -- the passage by the side of a front -- a conductor -- it is for preventing that the pars convoluta lobuli corticalis renis UU of conductor A' - D' of U characters can project each to a shaft-orientations rear side at the time of rotation of the above-mentioned ring-like fixtures 41-44 for production of the section, or it can twist to a hoop direction.

[0049] in addition, the object for pars intermedia -- U characters -- a conductor -- it is shown in drawing 13 instead of the fixture 2 for a presser foot -- as -- the special fixture 400 for immobilization -- U characters each -- the passage of rear ** of conductor A' - D' -- a conductor -- the chuck of the head of the section may be carried out and the twist activity by the side of the above-mentioned front may be done.

[0050] next, the object for the pars intermedia of a long-way-around configuration -- U characters -- a conductor -- the point E of the first location S1 of A', and these U characters -- a conductor -- the object for the pars intermedia of the small turn configuration which pi separated by A' and the electrical angle -- U characters -- a conductor -- the point of the second location S2 of B' is stuck. the same -- the object for the pars intermedia of a long-way-around configuration -- U characters -- a conductor -- the point E of the fourth location S4 of A', and these U characters -- a conductor -- the object for the pars intermedia of the small turn configuration which pi separated by A' and the electrical angle -- U characters -- a conductor -- the point of the third location S3 of B' is stuck.

[0051] the shape for drawers of moreover, U character -- a conductor -- the point E of the first location S1 of C', and these U characters -- a conductor -- the object for the pars intermedia of the small turn configuration which pi separated by C' and the electrical angle -- U characters -- a conductor -- the point of the second location S2 of B' is stuck. the same -- the shape of U character for drawers -- a conductor -- the point E of the third location S3 of C', and these U characters -- a conductor -- the object for the pars intermedia of the long-way-around configuration which pi separated by C' and the electrical angle -- U characters -- a conductor -- the point of the fourth location S4 of A' is stuck.

[0052] furthermore, the object for interlayer connections -- U characters -- a conductor -- the point E of the second location S2 of D', and these U characters -- a conductor -- the object for the pars intermedia of the long-way-around configuration which pi separated by D' and the electrical angle -- U characters -- a conductor -- the point of the first location S1 of A' is stuck. the same -- the object for interlayer connections -- U characters -- a conductor -- the point E of the fourth location S4 of D', and these U characters -- a conductor -- the object for the pars intermedia of the small turn configuration which pi separated by D' and the electrical angle -- U characters -- a conductor -- the point of the third location S1 of B' is stuck.

[0053] These edge adhesion activities are done as preparation for the following welding process.

[0054] Next, the head E of each set which adjoins each mutually [conductor A' - D'] U as shown in drawing 14 (Welding process) E -- every [a couple] -- welding -- the passage by the side of a front -- a conductor -- the section is completed, the coil of six phases of U, V, W, X, Y, and Z is formed by this, the coil of these 6 phase is connected, and a three phase stator coil (coil as used in the field of this invention) is completed mostly (refer to drawing 15).

[0055] (The shape of U character for drawers a conductor pars-convoluta-lobuli-corticalis-renis UU excision process of C') each shape for drawers of next, U character -- a conductor -- the bay S of C' is cut in the respectively suitable cutting locations 300 and 301 (refer to drawing 16), resin exfoliation of the point 400 is performed, only predetermined distance is bent to a hoop direction, respectively, and it considers as an outgoing line 500 (refer to drawing 17).

[0056] Six phase coils which have the outgoing line of a couple, respectively are formed. The drawer location of the outgoing line 500 of each phase coil is shown in drawing 19 .

[0057] Incidentally in this example, a total of six phase coils will be produced. at least six shape for drawers of therefore, U character -- a conductor -- C prepares for the ends drawers of each [these]

phase coil -- having -- moreover, the interior of each phase coil -- setting -- the object for interlayer connections -- the object for six interlayer connections -- U characters -- a conductor -- D is prepared.

[Translation done.]

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CLAIMS

[Claim(s)]

[Claim 1] a slot of a large number formed in a peripheral surface incore in a hoop direction predetermined pitch at abbreviation shaft orientations -- mutual -- the direction of a path -- separating -- respectively -- even segments -- a conductor -- inserting in -- each aforementioned segment -- a coil of a conductor, and business -- a segment which makes a point jump out of an end side side of said core -- a conductor -- an insertion process -- A head of a point is joined a couple every. said each segment -- said coil of a conductor, and business -- a segment which twists a point the degree of predetermined angle to an abbreviation hoop direction near the end side of said core -- a conductor -- a point crookedness process, each aforementioned coil, and business -- a segment which completes a coil end by the side of an end of said core -- a conductor -- a coil manufacture method of a dynamo-electric machine equipped with a point cementation process -- setting -- said segment -- a conductor -- a point crookedness process Adjoining according to an individual [while a hoop direction is met in an end side of said core at the end face section of each of said point for coil ends which jumped out of an end side of said core, and] A coil manufacture method of a dynamo-electric machine characterized by for a hoop direction cross section inserting a pin-like fixture of round a large number in the *** direction, and twisting a point for coil ends by the side of said end in the predetermined direction by using said pin-like fixture as the supporting point.

[Claim 2] said segment which projects from an other end side of said core, and constitutes a coil end by the side of the other end of said core in a coil manufacture method of a dynamo-electric machine according to claim 1 -- a coil of a conductor, and business -- the condition of having made the end face section extending in shaft orientations near the other end side of said core -- said segment -- a conductor -- a coil manufacture method of a dynamo-electric machine characterized by carrying out a point crookedness process.

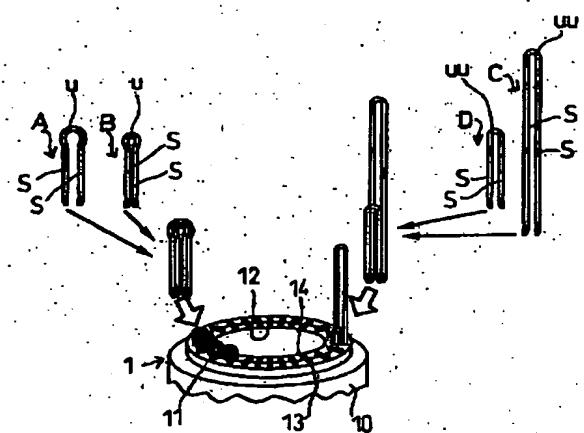
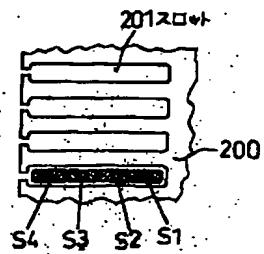
[Claim 3] said segment which projects from an other end side of said core, and constitutes a coil end by the side of the other end of said core in a coil manufacture method of a dynamo-electric machine according to claim 1 -- a coil of a conductor, and business -- while holding the end face section to hoop direction displacement impossible -- said segment -- a conductor -- a coil manufacture method of a dynamo-electric machine characterized by carrying out a point crookedness process.

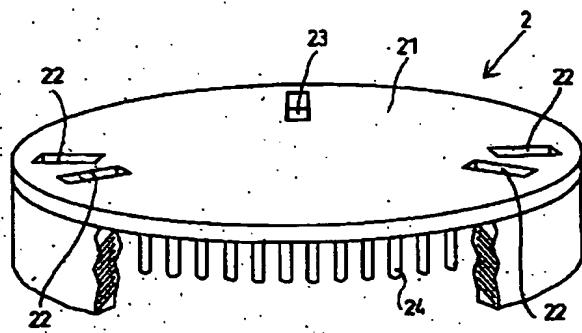
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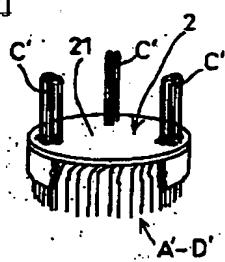
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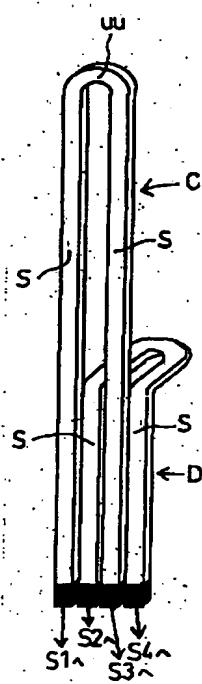
DRAWINGS**[Drawing 1]****[Drawing 2]****[Drawing 4]**



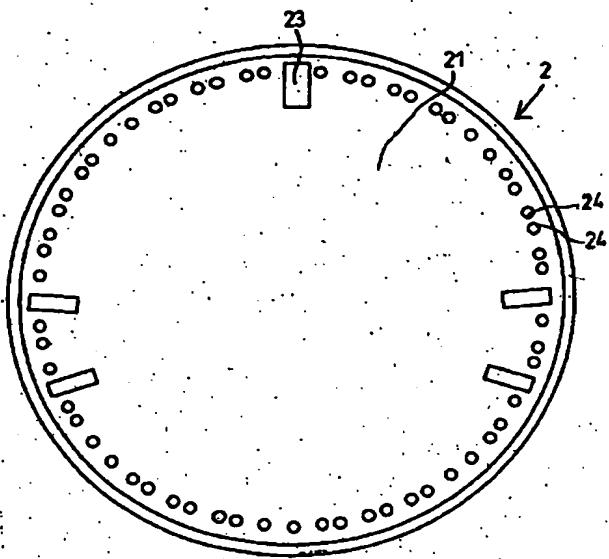
[Drawing 9]



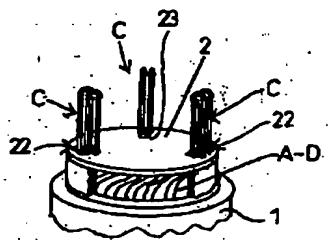
[Drawing 3]



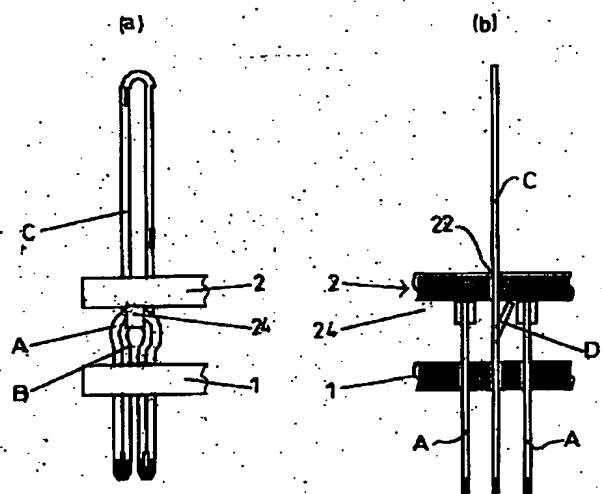
[Drawing 5]



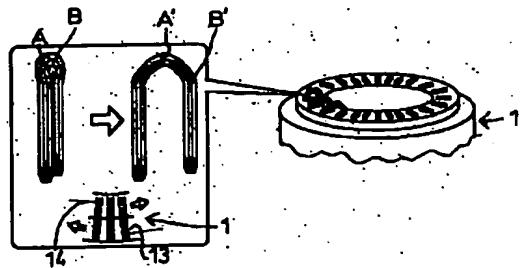
[Drawing 6]



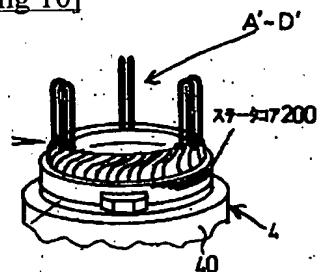
[Drawing 7]



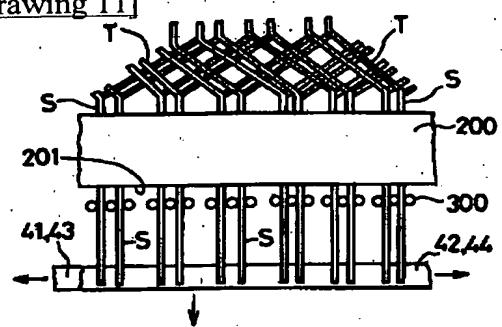
[Drawing 8]



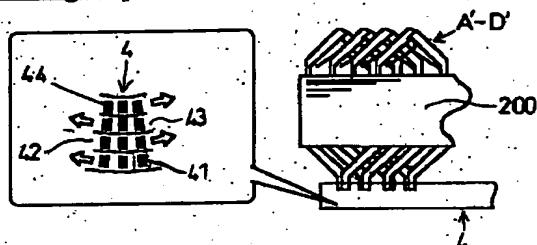
[Drawing 10]



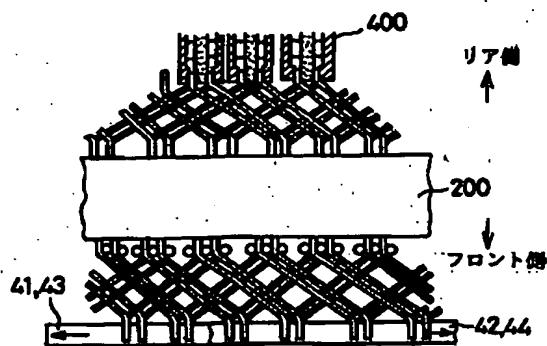
[Drawing 11]



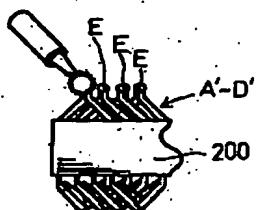
[Drawing 12]



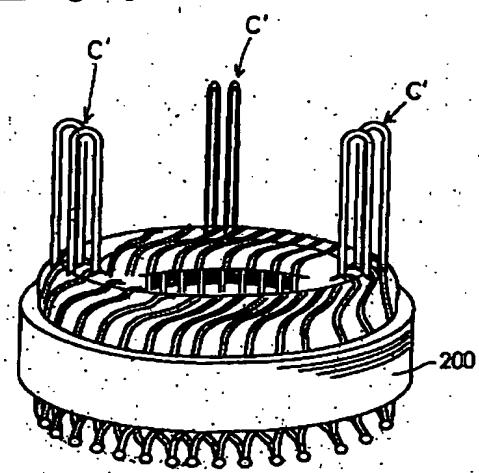
[Drawing 13]



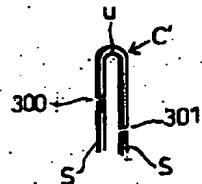
[Drawing 14]



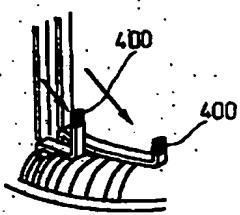
[Drawing 15]



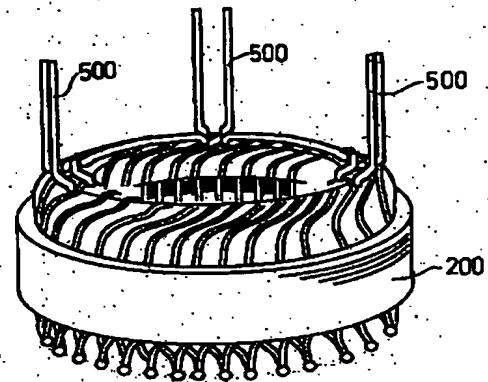
[Drawing 16]



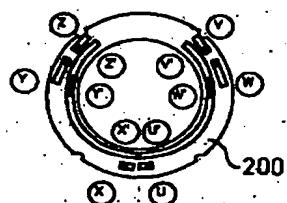
[Drawing 17]



[Drawing 18]



[Drawing 19]



[Translation done.]